Amendments to the Claims

1-30. (cancelled)

31. (currently amended) A method of analyzing results from an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from a vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

32. (previously presented) A method of analyzing results from an electromagnetic survey according to claim 31, further comprising:

normalizing each of the first and second survey data sets relative to the respective first and second normalization data sets or first and second functions specific to the first and second data sets respectively.

33. (previously presented) A method of analyzing results from an electromagnetic survey according to claim 31, wherein the first and second normalization data sets or functions are calculated from a rock formation model.

34.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 31, wherein the first and second normalization data sets or functions are calculated from the first and second survey data sets.

35.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 31, wherein the first results data set represents the difference between the first survey data set and the first normalization data set as a function of position within the area, and the analysis of the first results data set includes identifying a location of a boundary of the subterranean hydrocarbon reservoir.

36.   (currently amended) A computer program product bearing machine readable instructions stored on a computer-readable media for implementing a method of analyzing results from an electromagnetic survey by:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from a vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

37.   (currently amended) A computer apparatus loaded with machine readable instructions for implementing a method of analyzing results from an electromagnetic survey by:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from a vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

38.   (currently amended) A method of analyzing results from an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from naturally occurring magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

39.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 38, further comprising:

normalizing each of the first and second survey data sets relative to the respective first and second normalization data sets or first and second functions specific to the first and second data sets respectively.

40.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 38, wherein the first and second normalization data sets or functions are calculated from a rock formation model.

41.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 38, wherein the first and second normalization data sets or functions are calculated from the first and second survey data sets.

42.   (previously presented) A method of analyzing results from an electromagnetic survey according to claim 38, wherein the first results data set represents the difference between the first survey data set and the first normalization data set as a function of position within the area, and the analysis of the first results data set includes identifying a location of a boundary of the subterranean hydrocarbon reservoir.

43.   (currently amended) A computer program product bearing machine readable instructions stored on a computer-readable media for implementing a method of analyzing results from an electromagnetic survey by:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from naturally occurring magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ <u>provide a determination</u> if hydrocarbon is present.

44.   (currently amended) A computer apparatus loaded with machine readable instructions for implementing a method of analyzing results from an electromagnetic survey by:

providing a first survey data set obtained from a vertical electric dipole (VED) source;

providing a second survey data set obtained from naturally occurring magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

45.   (currently amended) An electromagnetic survey method for surveying an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

obtaining a first survey data set from a vertical electric dipole (VED) source;

obtaining a second survey data set from a vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

46.   (previously presented) An electromagnetic survey method according to claim 45, wherein the VED source and the VMD source are mounted on a common submersible vehicle.

47.   (previously presented) An electromagnetic survey method according to claim 45, wherein the first and second survey data sets are obtained together.

48.   (previously presented) An electromagnetic survey method according to claim 45, wherein the first and second survey data sets are obtained separately.

49.   (previously presented) An electromagnetic survey method according to claim 45, wherein the VED and VMD sources are operated at different frequencies.

50.   (currently amended) An electromagnetic survey method for surveying an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

obtaining a first survey data set from a vertical electric dipole (VED) source;

obtaining a second survey data set from naturally occurring magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ <u>provide a determination</u> if hydrocarbon is present.

51.   (currently amended) A method of planning an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole

source and a second survey data set from a simulated vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ <u>provide a determination</u> if hydrocarbon is present.

52.   (previously presented) A method of planning an electromagnetic survey according to claim 51, further comprising:

repeating the simulation for a number of source-to-detector distances and frequencies in order to select optimum surveying conditions in terms of source-to-detector distance for probing the hydrocarbon reservoir.

53.   (previously presented) A method of planning an electromagnetic survey according to claim 51, wherein the model includes a body of air above the body of water, and wherein the simulation takes account of signal propagation paths including the body of air when calculating the first and second survey data sets.

54.   (previously presented) A method of planning an electromagnetic survey according to claim 51, further comprising:

normalizing each of the first and second survey data sets relative to respective first and second normalization data sets or functions specific to the first and second survey data sets respectively.

55.   (currently amended) A method of planning an electromagnetic survey of an area that is thought or known to contain a subterranean hydrocarbon reservoir, comprising:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole source and a second survey data set from simulated magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

56.   (previously presented) A method of planning an electromagnetic survey according to claim 55, further comprising:

repeating the simulation for a number of source-to-detector distances and frequencies in order to select optimum surveying conditions in terms of source-to-detector distance for probing the hydrocarbon reservoir.

57.   (previously presented) A method of planning an electromagnetic survey according to claim 55, wherein the model includes a body of air above the body of

water, and wherein the simulation takes account of signal propagation paths including the body of air when calculating the first and second survey data sets.

58.   (previously presented) A method of planning an electromagnetic survey according to claim 55, further comprising:

normalizing each of the first and second survey data sets relative to respective first and second normalization data sets or functions specific to the first and second survey data sets respectively.

59.   (currently amended) A computer program product bearing machine readable instructions stored on a computer-readable media for implementing the method of planning an electromagnetic survey by:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole source and a second survey data set from a simulated vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

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60.   (currently amended) A computer program product bearing machine readable instructions stored on a computer-readable media for implementing a method of planning an electromagnetic survey by:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole source and a second survey data set from simulated magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

61.   (currently amended) A computer apparatus loaded with machine readable instructions for implementing a method of planning an electromagnetic survey by:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole source and a second survey data set from a simulated vertical magnetic dipole (VMD) source;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

62.   (currently amended) A computer apparatus loaded with machine readable instructions for implementing a method of planning an electromagnetic survey by:

creating a model of the area to be surveyed including a seafloor, a rock formation containing a postulated hydrocarbon reservoir beneath the seafloor, and a body of water above the seafloor;

setting values for water depth, depth below the seafloor of the postulated hydrocarbon reservoir, and resistivity structure of the rock formation;

performing a simulation of an electromagnetic survey in the model of the survey area by obtaining a first survey data set from a simulated vertical electric (VED) dipole source and a second survey data set from simulated magnetotelluric (MT) electromagnetic fields;

generating a first normalization data set specific to the first survey data set;

generating a second normalization data set specific to the second survey data set;

combining the first survey data set and first normalization data set to obtain a first results data set that represents a difference between the first survey data set and the first normalization data set;

combining the second survey data set and second normalization data set to obtain a second results data set that represents a difference between the second survey data set and the second normalization data set; and

comparing the first and second results data sets to ~~determine~~ provide a determination if hydrocarbon is present.

63.   (currently amended) In combination, a [A] submersible vehicle for subsea electromagnetic surveying: ~~, comprising:~~ a vertical electric dipole (VED) source carried by the submersible vehicle; and a vertical magnetic dipole (VMD) source carried by the submersible vehicle.

64.   (currently amended) A combination ~~submersible vehicle~~ according to claim 63, wherein the VED source and the VMD source comprise respective antennae mounted such that their dipole axes are aligned.

65.   (currently amended) A combination ~~submersible vehicle~~ according to claim 63, further comprising at least one waveform generator operable to transform a high voltage, low current AC drive signal received from an umbilical cable into a low voltage, high current AC drive signal to drive the VMD and VED antennae.

66.   (currently amended) A survey apparatus comprising:

a submersible vehicle comprising a vertical electric dipole (VED) source and a vertical magnetic dipole (VMD) source;

a signal power supply unit for generating a high voltage, low current signal power supply for the submersible vehicle; and

an umbilical cable releasably connectable at ends thereof to the signal power supply unit and the submersible vehicle.

67.   (previously presented) A survey apparatus according to claim 66, further comprising a plurality of electromagnetic signal detectors.

68.   (currently amended) In combination, a [A] surface vessel ~~carrying~~ and a survey apparatus according to claim 66, wherein the submersible vehicle is coupled to the surface vessel by the umbilical cable.

69.   (currently amended) In combination, a [A] static platform ~~carrying~~ and a survey apparatus according to claim 66, wherein the submersible vehicle is coupled to the static platform by the umbilical cable.

70.   (currently amended) In combination, a [A] well ~~carrying~~ and a survey apparatus according to claim 66, wherein the submersible vehicle is coupled to the well by the umbilical cable.

71.   (currently amended) In combination, a [A] borehole ~~carrying~~ and a survey apparatus according to claim 66, wherein the submersible vehicle is coupled to the borehole by the umbilical cable.